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SPACE AND REALITY[1]

II. REAL SPACE

We have so far examined into the presuppositions of space construction and found that these must be expressed in biological terms. We next took up the ontogenetic side of our space perception and found that the content, in so far as it exists, is probably concomitant to the going on of the growth process, determined by the phylogenetic tendencies and intra- and extra-organic stimuli. What actual content there is, moreover, must be determined by statistical inquiry, and not *a priori*. We then examined into geometrical construction, and found this to be a matter of logic and to be conducted as any free logical inquiry. The ideals, however, of mathematics, as other ideals, seem to have a phylogenetic basis. Lastly we examined into the conception of space, as perspective, by metaphysical idealism. When regarded as phenomenal we had no reason to quarrel with this view. When, however, translated into terms of absolute idealism, as by Fichte, space loses its significance.

We must now turn to the other aspect of our concept and try to discover what the real space zero means or what difference it makes in our accounting for the facts of experience.

The series aspect of space, we have agreed, is subjective construction. Points exist only as we posit them as the ideal pegs on which we hang our qualitative world. To make up a real world of such ideal points is absolute nonsense. But what remains after we abstract from this series character? Nothing at all, is the answer. But that nothing we shall try to show is not a merely ideal nothing, but a real nothing which conditions not only subjective construction, but real action as well.

First of all such a space zero is perfectly conceivable. The modern study of number has shown that the conception of nothing does not equal no conception. It is not 'unthinkable' and 'unspeakable,' as Parmenides and Melissos dogmatically maintained in regard to just the space zero. The zero of the number series is of basic importance in the whole conception of the number series; and as the number series is not intelligible without it, the number zero possesses all the reality of the series which it limits. But we can conceive empty space, as we conceive the number zero, as a limit by abstracting from the contents of space or the things in space. Hence space must be as real as the things in space. It is a matter of surprise that though the importance of the zero concept for number has received so much attention in recent times, the importance of the space zero, which both chronologically and ontologically is more fundamental, should have been ignored. But the reason for this can be found in the fact that since Kant thought has been more interested in its own machinery than in its objective conditions.

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[1] This paper concludes the author's discussion of this subject. His first paper, under the subtitle of 'Ideal or Serial Space,' appeared in this JOURNAL, Vol. III., No. 20.

Once having shown the conceivability of empty space we must prove its existence, as we prove the reality of any other concept, by showing its convenience for describing the facts of experience. The criterion of the reality of our concepts is everywhere the same: Does the concept work? Does it make experience simple, consistent and intelligible? Must we act as if it were so?

We must conceive of empty space as the precondition of filled space, as the limit of exhaustion of filled space, which, moreover, we can approximately get. If by exhaustion we could get the space zero without content or resistance, it must have been real all the while. It is not necessary to the reality of spatial non-being that it should actually exist separately or empty. If we can approximate it as a limit, it must be just as real as though it existed separately. We can not get the quality of blue separate from all other facts, yet we do not therefore deny its existence. It is convenient, at any rate, to conceive of a space-nothing, whether empty or filled. Only with reference to it can relative emptiness or relative resistance have meaning. To illustrate, let us take this instance suggested by my friend, Dr. Bruce Hill: Hydrogen gas is the only gas that passes through platinum. Suppose, then, that you have a vessel of platinum filled with pure hydrogen gas. Let this escape, and what is left?

The conception of a space zero has proved convenient as a limit in conceiving Newton's first law of motion. While this law is an abstraction, it must be remembered that such abstraction is empirically possible to a certain extent. The abstraction, therefore, is not merely ideal. On the contrary it is real non-being which we find it convenient to conceive in treating of resistance and motion. I can hardly see how a merely ideal limit could make any difference to actual movement. Thus points, lines and surfaces, while legitimate mathematical abstractions, neither obstruct nor facilitate movement. Even if we have not been able to get absolutely empty space we can, as already shown, approximate to it and predict definitely what would happen if we could get it. The only problem is: Are we compelled to assume such a zero in order to account for the facts of experience? Having assumed such a real zero, we find it easier at any rate to account for the forms of motion as they actually take place owing to the resistance and diversity of the physical world. The convenience of the conception must indicate that it has a foundation in the real, otherwise it could not be empirically approximated as well as hypothetically useful. It is the real limit which makes our conception relevant.

Even geometry in assuming free mobility as one of its few remaining axioms shows that it means by space something more than series, for free mobility is the very precondition of space construction. If, after abstracting from things, space itself offered resistance, geometry would not be possible. Even in geometry, therefore, non-being space is presupposed as objective to serial construction.

This conception of space explains distance, which can not be explained as a property of things and yet conditions the actions of things. By distance I do not presuppose our geometrical concepts such as the straight line. A straight stick is more convenient than a crooked stick for social measurements, but in either case we presuppose the separateness or side-by-sideness of perceptual processes. A yard stick, while a convenient unit, does not create the distance it measures. This is different, moreover, from the ideal distance or stretch in our conception of series, for example. Distance transferred to mental processes and their externality is only a figure of speech. Space distance is the only real distance we can conceive. All other distance or stretch depends upon this. To make number distance or tone distance possible, we must spread out our qualities in space. Except for space distance all qualities or facts would have to coalesce or interpenetrate. Empty space, then, must be real, if pure distance must be conceived as real.

I can not see how the conception of distance, with all it implies for reaction on every plane of existence, can be reduced to a property either of physical things or of selves, yet without this fact both acceleration and the limitations of intersubjective communication become unintelligible. Wills, appreciative selves, are not extended, but are limited by conditions of separateness, not of their own making, but which must be met and can not simply be brushed aside as illusions. Here lies the difference between the derivative conception of distance or stretch in series such as the number and tonal series. Here the distance or stretch is determined by the will, is comprised within its purpose. A long stretch or a short stretch will serve equally well to spread out its contents; and as the termini are simply of the will's own positing, they put no condition upon the will as regards passing from one to the other. They are only ideally external within a unity of consciousness which claims them equally and *simul.* Not so with space distance. Here the distance limits the will and the realization of its purposes. The distance which separates Kansas and Harvard and limits my intercourse with its group of divine philosophers is not the creature of my ideal positing simply; my ideal bridging of it does not remove the limitation to my will as in the case of two points in a series. If it is posited by me, it is because I am compelled to do so, and no ideal enlightenment from my Kantian friends serves to sweep the limitation away. In short, what makes other egos and things objective to me, *viz.*, their independence of my subjective purposes, makes also space as distance objectively real to me. As I must 'acknowledge' other egos, so in order to realize my practical purposes I must 'acknowledge' space. Space is the condition of the externality of egos and things, whether they can be 'acknowledged' as egos or not. It is not a subjective, but an intersubjective condition, limiting the communication and cooperation of egos. Within the ego space exists at most only figuratively, as when we speak of the space of our ideas.

I know we often speak, in this age of electricity, of annihilating distance. It is true that social sympathy and unity are possible in this age to an extent they never have been before. Humanity by means of the telegraph can live a common life to a marvelous degree. And yet it is loose language even so to speak of the annihilation of distance, for distance does make a decidedly measurable difference to our communication. However much the conditions of social life have altered since the days of the proximity of savage tribal life, still it makes a difference to the kind of relations we can have with each other that we are separated by distance.

Our space conception must be such in the end as to satisfy our space intuition. While we must not invoke intuition as explanation, yet where our intuitions, as in our general reactions upon our environment, are due to survival selection, they have, as Spencer says, well-nigh the force of demonstration and must not be lightly brushed aside. While the space intuition can not be expected to separate sharply between the physical and spatial character of our world, and while in it we find such physical categories as three-dimensionality and continuity mixed with such spatial categories as non-resistance and distance, yet the unspoiled space intuition always has insisted upon an ontological non-being as over against physical and subjective beings. Hence the natural part the void plays in early cosmogonic and physical theories. However much cruder the tools of Leucippus and Democritus than those of Kant, yet their conception of an ontological nothing gives a more fundamental character of the space concept than the aspect of serial construction emphasized by the Kantians.

This conception of space greatly simplifies the problem of the attributes of space and hurls the objections, with which the concept of space in the past has been burdened, back into the realm of the subjective, the realm of tools, where they belong. Thus empty space can not be said to be extended. Things are extended, not space. Extension like color is the relation of energy to our psychophysical organism. To speak of a colored energy or, to use a known type of energy, a colored will, would be as sensible as speaking of extended energy or extended will. Extension has probably its physiological basis in the number of physiological elements, peripheral and central, which are stimulated, as color has its basis in a certain retinal structure. It is a relation, therefore, an equivalent for certain changes, not an entity, and in so far as relations for the time being are real, so extension and color must be regarded as real. But they are physical qualities, not space qualities. When we once get rid of the notion of energy as extended and come to regard extension as a subjective equivalent for a certain form of irritation, the superstition against action at a distance and the absurdly contradictory ether medium will probably vanish. Energy is where it does work. There is nothing against energy radiating or connecting up in empty space but the prejudice that extension has a different sort of objectivity than color or taste. The conception of continuity likewise will be taken out of court so far as space is concerned. The spreading or radiating of energy creates its own continuity. A continuous nothing is as meaningless as a discrete nothing. The continuities and the discontinuities, the fluidities and the interferences, must be expressed in physical terms; and physics has wisely substituted mathematical equations for mythological media depending upon certain gross forms of psychological imagery hypostatized. The equations have nothing to do with whether action is due to the radiation from energizing center to center over pure distance and the resistances due to interferences of the radiations, or whether there is an extended medium, such as ether. Rays or spreadings of energy, whether with or without a medium, are at least the only physical continuity I can conceive. Centers corresponding to wills, however much simpler in character, are the only energetic discontinuities I can conceive.

The hypostatizing of a medium such as the ether medium is due to custom. In our gross sense-perception one end of a rope appears to be of a piece with the other end. Not so if we substitute molecular action for our gross sense-continuum. Still, even then, owing to our ingrained custom, it seems uncanny, to use Mr. Hill's expression, for one thing to move another without something between.

While to speak of the transmission of energy in an *extended* medium is to confuse two different orders of being, it is still true that extension is intimately bound up with the space character, as duration is with the time character. While extended energy or extended will is what Descartes would call a confused idea, and while extensity or voluminousness is a subjective fact, yet the multiplicity of stimuli and their externality which are the necessary conditions of such feeling of extensity must, at any rate, be characters of the real world.

The question has been raised as to the relation of diversity or multiplicity to space. In answer to this I wish to say that it is possible to have distinction of qualities or properties without spatial spread-outness. The same thing or individual, in other words, may possess many qualities, all of which interpenetrate or occupy the same space. If they did not, the unity of the thing would be impossible. Thus the watch is yellow, hard, cold, round, ticks, etc. It sustains a diversity of chemical, physical, commercial, esthetic and other relations to other individuals. Psychologically this locating of qualities and relations in each other's space is no doubt the result of the law of economy. But this law itself has been forced upon us as a result of the practical necessities of adjustment. These qualities, moreover, are no less distinct because they occupy the same space. Here in the unity of the thing we come the nearest to having an ontological point, for a thing, whether conceived psychologically as a complex of qualities or metaphysically as an energetic entity capable of certain reactions, while it is in space, can not be said to occupy space. The problem of spatial externality arises only when we must ' acknowledge ' different coexisting and interacting individuals, whether egos or things. This, moreover, has nothing to do with multiple selves, for in the first place these are generally successive, and we are dealing here with simultaneous discreteness. In the second place, in the case of multiple selves, the psychophysical basis of consciousness has become disintegrated or dissociated in some way, so that while we have one skin, we have really more than one space thing. What again we shall recognize as an individual depends greatly upon our selective purpose and may vary all the way from the electron to the universe.

The stock objections brought against space as quantitative and serial would one and all be irrelevant to this conception of space. Space as real zero is neither made up of parts nor a whole; it is neither one nor many; neither continuous nor discrete; neither infinite nor finite; neither quantitative nor qualitative. These are one and all ideal constructions to manipulate processes in space. If they lead to contradictions, that only shows the crudity of our conceptual tools. It does not discredit space any more than processes in space.

Since space is not quantitative, it does not consist of spaces added to spaces, nor is it the unity of spaces. This is simply the gross imagination of minds, not accustomed to logical abstraction, who confuse sense things, barrelfuls and bucketfuls, with space. Thus the conception of a real zero-space saves us from the antinomies to which the conception of a real serial space has given rise, and shows the subjective character of the antinomies, not of space.

Even dimensionality can not be regarded as a space category. Whether the world of physical processes must be conceived of as having one, two, three or *n* dimensions, as having positive, negative or zero curvature, can not be settled *a priori,* but must be ascertained as we ascertain any other attribute of the constitution of our physical or perceptual world. That we arrange our perceptions according to three axes or systems of coordinates is due proximately to our being equipped with three spirit-levels, the semicircular canals, the convenience of which, however, seems to point to a certain structure of the physical world.

It has been suggested that while space can not be said to have any particular number of dimensions it still must possess dimensionality. But all that could be meant, so far as I can see, by this dimensionality in general is simply the indifference on the part of space to any particular determination, and hence the possibility of being determined by means of such a system of coordinates as the character of the physical world may require. I can not see, however, how you can have coordinates that are no coordinates in particular.

It might be objected in that case that neither can externality or distance exist without termini or facts and, therefore, that distance involves dimensionality. To this I would reply that measured or particular distance can only exist in a world of individuals, and with such a world we have dimensionality as well. That, however, does not prevent us from logically distinguishing between them and from regarding one as a physical attribute and the other as a space attribute, for while we can and must abstract the distance character and treat it as an independent variable, both in our physical equations and in our inter-subjective intercourse, we can not thus abstract the axes or coordinates from the stuff structure of our world. Dimension in general, in other words, is merely a matter of subjective abstraction, while space as the condition of distance is a *forced* concept.

Space can properly be said to have only two attributes. It is the condition for free mobility and for distance. Free mobility or reversibility, though the absence of character in the sense of any positive determination, becomes an important attribute as a limit in conceiving motion. It means that space as such does nothing to things moved in space. As distance, space is not the mere ideal form of externality, but the real condition or objective possibility of the externality of things or egos. It is with reference to the qualitative and quantitative diversity of the world pure passivity, not the passivity of Plato, Aristotle or Hegel, which after all is such as to distort the pure forms or make them fall short of realization, but passivity as the absence of resistance, thus throwing the responsibility for what happens on the character of things. The only condition it imposes on things is that of distance and that condition it imposes on the world of appreciation as well as on quantitative motion.

The objections brought against empty space by Aristotle are different. They aim at the real space concept. They may be classified under two heads: those due to prejudice, or his own space concept; and *argumenta ad hominem* as against the space conception of the atomists. Aristotle's own conception of space is that of figured, continuous extension, 'the limit of the surrounding body in respect to that which it surrounds.' Hence space for Aristotle is finite, limited by the limits of the world, and conversely it becomes absurd to speak of space outside the world, or empty space. As we have rejected Aristotle's conception of space already as regards its extension and its figured character, his objections from this point of view need not detain us. They simply amount to dogmatism, not criticism. No doubt Aristotle is right that the universe of things, whether bodies or selves, is a finite affair. Science believes in a limited number of chemical substances; a limited number of stars and astronomical positions; a limited number of human beings for census purposes, etc. To speak of infinite variety or infinite attributes is simply a rhetorical figure on the part of poetical philosophers, showing at most the unchecked character of their imagination. A real infinite world, whether as regards extent or diversity, would make science as impossible as would multiple independent worlds. Facts must have a certain relation to each other, must make a difference to each other, and these relations and facts must be finite to make knowledge possible. But a finite universe has nothing to do with a finite or infinite space. Facts determine each other. The arrangement of things in space, the different meanings, qualities and values things have are due to the relations of things to each other or the way they are connected up. Space does not determine them except as regards distance, and that would be irrelevant where there are no facts.

As regards Aristotle's criticisms of the atomists, they are on the whole well taken as *argumenta ad hominem*. Empty space does not account for motion or rest; it accounts for no tendency downward or upward; much less can it account for the different rates of motion as faster or slower in so far as you abstract from the relations of bodies. Democritean atomism, which had assumed that heavier atoms, in a void, would fall more rapidly than lighter and thus would collide and form a whirl, was not able to stand against Aristotle's criticisms; and the crude view of 'natural places' displaced the atomic whirl. Motion and differences of motion must no doubt be accounted for by the constitution of the physical world, except in so far as the conception of distance is involved in the conception of motion or communication.

This conception saves us from the absurdity of regarding space both as serial and as real, as our construction and as conditioning the world of processes. The contradictions of this position have been sufficiently battered to pieces from Zeno down. The serial must necessarily be our subjective construction, our tool for manipulating processes or facts. This position, therefore, allows for the truth of idealism. It admits the conclusions of idealism so far as it goes, but at the same time it does justice to the surd which realism has always felt to remain and the omitting of which has made idealism so ghostly, bottomless and incredible. Common sense is right, if it can only be made to understand itself.

Nor can we regard space subjective and motion objective, the half-way house of Lotze and others. If we regard motion and change as objective, we have to regard space as objective. This is true of qualitative change as well as quantitative, as the former too would be impossible without some kind of pluralism and externality. Melissos saw deeper than he knew when he maintained that if there is rearrangement there must be empty space, even though he supposed the conclusion to be absurd (taboo it really had become, and has been mostly since, to regard non-being as real) and so returned to the solid-block universe of Parmenides, which he conceived as unlimited to exclude empty space from the outside.

In explaining motion we have found empty space useful in two ways. First, it makes it possible to abstract from bodies and resistance, and so to state Newton's first law of motion. Secondly, it gives us the possibility of objective distance, which can not be reduced to the properties of things. Reactions of things, while they are determined by the properties of things, also vary with the distance, which, therefore, can not be regarded as merely subjective. It is hard to see how mere subjective position could influence the intensity of motion. Motion in an ideal space should be consigned to the confused limbo of square circles, mermaids and centaurs.

Most important of all is the fact that this conception of space satisfies the criterion made so much of by the idealists themselves, and more than once implied in the preceding, *viz.*, that those conditions which limit and must be taken account of in the realization of purpose must themselves be real. Otherwise they would not be conditions. Space and time must certainly be taken account of in realizing our human purposes; therefore, they must be as real as those purposes themselves. If they were merely illusion, or 'mere appearance,'[2] then it ought to be possible to ignore them, at least after finding out the truth about them. Take space distance, for example. Our measurement of this with reference to geometrical ideals, such as the straight line, our use of a particular kind of measuring rod, such as the yardstick, must be regarded indeed as a matter of ideal selection and control. But if I live in Kansas and an important philosophical session is held in New York, or I want to see my friends across the sea, the mere declaring space an illusion does not annihilate the limitation. Intermediary processes must somehow be reckoned with; and those processes presuppose space as the condition of their externality. Thus space as distance conditions the equations of the astronomer and the joy and communion of willing selves. And so with time. No mere conversion to absolute idealism will make new wine old, will convert youth into old age or make the faded flower bloom again. I do not see how in the only world of purposes of which we know anything, it is possible to ignore the space and time limitations of those purposes. We grant that the space and time characters taken apart are meager enough when contrasted with the concrete life of feeling and willing. We are indeed in our inmost beings willing and appreciative selves. But space and time remain, nevertheless, irreducible limits to which we must adjust ourselves, if we would be sane, not deny; and in so adjusting ourselves realize our purposes.[3]

I do not insist upon a different reality for space than for egos or things, *i. e.*, for energy, whatever form it may take. All I insist upon is that we must 'acknowledge' both. The question whether space could exist before things could only have meaning for those who, with the medievals, regard the world of things as created at a finite time out of nothing, as embodying eternal archetypes or what not. It is the province of philosophy like science, however, to investigate the constitution of the world, not its creation. The temporal priority of space to things can, therefore, have no significance for us. We can, however, abstract distance from things and must do so, both for purposes of physical science and for practical life.

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[2] I can not help thinking, notwithstanding the objections of the Kantians, that the psychological term illusion is a fair equivalent for Kant's 'mere appearance.' For illusion is not baseless, but it owes its character to the apperceiving subject rather than the stimulus. It is a mode of apperception, but not true of the real.

[3] For the author's treatment of time, see his monograph, 'Time and Reality,' the *Psychological Review Monograph Supplements*, No. 26, also his article, 'The Concept of Time,' this JOURNAL, Vol. II., No. 14.

If one should hold with the absolute idealist that there is only one individual, one unitary experience in which all facts are modes or qualities, one completed purpose, one simple feeling, then reality would cease to be definable in space terms. In the one blissful moment of the absolute, distance could have no significance. All I can say is that, in the only reality we know anything about, we are forced to recognize different individuals and their externality.

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THE PRAGMATIST'S MEANING OF TRUTH

I THINK it can be safely assumed that the readers of this JOURNAL by this time know sufficiently well what the pragmatist means by truth, by a true idea. In this brief article I shall attempt to show that this meaning is not the correct one, that it is not the correct meaning of truth, even if the pragmatist's contention be admitted that truth in every case of it is useful, that every true idea does lead to beneficial consequences, to desirable experience of some sort. The proposition I shall maintain is, that in any situation in which an idea does lead to profitable or desirable experience, it is not these consequences which make this idea true, but this idea is able to lead to these consequences because it is true, and true because of something which the pragmatist overlooks. To be more specific, admitting that the true idea does always possess a practical value, does have the instrumental function which the pragmatist assigns to it, I shall attempt to show that the pragmatist has not rightly answered the question, *how* is a given idea able to lead to these prosperous and satisfying issues, how *can* it have this instrumental function?

My position can best be made clear by the study of a concrete instance. Let us suppose a sojourner in the Adirondacks is lost in one of those forests. He is without shelter and without food; and